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EXCESSIVE SEXUAL DEVELOPMENT IN HYDRA OLIGACTIS WITH SPERMARY ON TENTACLE

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This specimen of *Hydra oligactis* was found in an aquarium with other normal individuals of the same species in February of 1918. The culture was abundantly supplied with food, such as Daphnia, Cyclops, and various other Crustaceans. The specimen was killed with a solution of corrosive sublimate and acetic acid, stained in a special preparation of borax carmine, and mounted in Canada balsam. It measures 11 mm. in length, the body 8½ mm. and the tentacles 2½ mm. as it is mounted on the slide. Its extreme length when living was 13 mm. Fifteen spermaries and two ovaries occur on the body and one spermary on one of the tentacles of the specimen (See figure). The spermary on the tentacle appears to be perfectly normal in all respects except location. The question now arises as to the cause of its occurrence on the tentacle.

Parke cites the following instances in the establishment of normal tentacles from abnormal ones. "A nine-tentacled Hydra fusca with one branching tentacle was isolated on February 27th. On February 28th one branch had revolved about 45° till it was in line with the longitudinal axis of the tentacle, while the other one appeared somewhat shorter than it did at first. On March 1st the small branch was almost entirely resorbed. It was much nearer the end of the tentacle than before and appeared as a small outgrowth from the tentacle. This apparent shifting of the small branch, by a migration of the short branch, may have taken place in three ways: by a shortening of the long branch, by a migration of the short branch towards the end of the tentacle, or by a fusion of the two branches along the median line. The first or last explanation seems the most plausible since similar instances were seen in which there could be no doubt that these were the processes involved. On March 3rd the small branch was entirely resorbed, leaving the Hydra with nine normal tentacles. Two other instances of regulation of forked tentacles in the same manner were observed." He states further that his observations show that branching tentacles may arise by the fusion of two tentacles and may regulate themselves by a complete fusion along their median sides so as to form a single tentacle.

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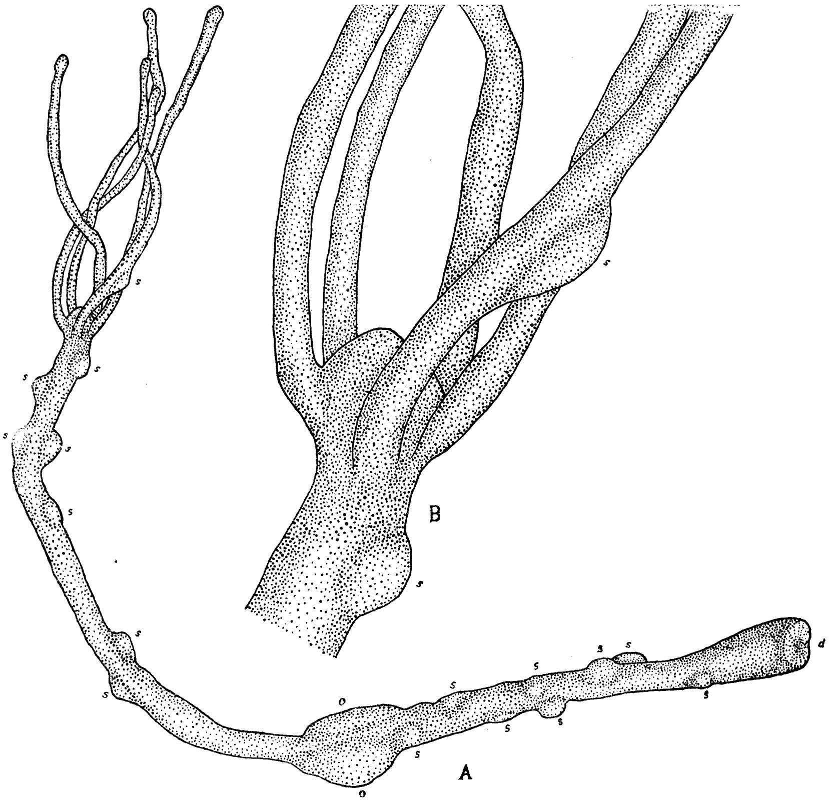
[1] Studies from the Zoological Laboratory, The University of Nebraska, No. 130.

In further observations he found that by regulative processes two distinct tentacles could be reformed out of two fused tentacles. He cites several instances in which two of the tentacles were fused near their ends and not near their bases along the median line. "This fusion," he states, "may have been caused by an injury to one of the tentacles, the other tentacle having become attached to it. This seems probable from the fact that alternate tentacles as well as adjacent tentacles were found fused in this manner,..... One eight-tentacled Hydra was found in which two alternate tentacles had stuck together at a point about three fourths of the distance from the base to the tips of the two tentacles at the point of fusion. There was no connection between the cavities of the two tentacles at the point of fusion. The next day after the Hydra had been isolated, one of the tentacles had constricted off from the other tentacle just below the point of fusion of the two, leaving the tip of its tentacle attached to the other branch. The cavities of the two branches



Hydra oligactis: A, showing 18 gonads; *s*, spermary; *o*, ovary; *d*, basal disc. B, showing position of spermary on tentacle.

were in direct communication. The process of regulation that now took place was exactly as in the Hydra described above. This is a good example of how branching tentacles may originate." Both tentacles became normal. He summarizes his conclusions with the statement: "It appears that three regulative processes may take place in the establishment of normal tentacles; viz. (1) fusion, (2) resorption, (3) constriction."

The theories of fusion and constriction suggest the idea that by a contact of the tentacle with the spermary in its original position on the body of the Hydra the two were fused; and then by a process of constriction the spermary was severed from the body, leaving it in its present position on the tentacle. Parke's reference to the *migration* of a short branch of a tentacle, mentioned above, also suggests the idea that the spermary *migrated* from an original position on the body to its present position on the tentacle. Probably the most plausible suggestion, however, is that the position of the spermary is due to an unusual local stimulation of a group of interstitial cells in the ectoderm of the tentacle, causing abnormal development in that location. Due, however, to the absence of facts regarding previous conditions in the aquarium, it is impossible to throw any light upon the real cause of this abnormal condition, except by way of suppositions from previous investigations.

Whitney, in his observations on Hydra viridissima, found that when they are subjected to a low temperature and starvation they develop testes and eggs. Hertwig, however, found that if Hydra oligactis is kept at a temperature of 8°–10° C. it will develop testes irrespective of the food conditions. At the time of the discovery of this specimen of Hydra oligactis that was about the temperature of the room in which the aquarium that contained this specimen was kept.

Extensive experimental work on sexually reproducing Hydras would undoubtedly reveal the generality or abnormality of this occurrence.

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